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Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Forest

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The Victorian Naturalist

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Ken G. Simpson photographed this young Southern Elephant Seal at Macquarie Island in 1965.
Photo by courtesy A.N.A.R.E.

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Distribution and Polymorphism of *Tribulus terrestris* sens. lat. in Australia

V. R. SQUIRES*

Tribulus terrestris L., an almost cosmopolitan plant, is widespread in Australia. Australian populations of *T. terrestris* are believed to arise from two sources, an introduced form which is common in southern Australia and a native form common in central and northern Australia.

The species, as conceived in Australia, is polymorphic. This variation is reviewed in the light of cyto-taxonomic considerations. It is concluded that careful breeding experiments and cytological examination of a wide range of Australian material would throw light on the question of whether *T. terrestris* is one extremely variable species or whether at present several closely allied species are included under this name.

Introduction

Tribulus terrestris is a weed of cultivated fields, vineyards, recreation areas and waste places (roadsides, railway yards etc.). Its success as a weed depends on a high reproductive capacity, an effective means of seed dispersal and an ability to germinate rapidly under low moisture and thus gain many favourable micro-sites for seedling establishment (Squires 1969). Control measures are generally ineffective, unless repeated frequently, and are not usually attempted except in areas of intensive land use.

T. terrestris is believed to be native to Australia (Squires 1968) but in introduced forms occur in the southern, winter rainfall regions (Squires 1969). The earliest records of the introduced forms dates from the early 1900's (Anderson 1910). Since that time it has become well established on all but the heaviest textured soils of the major sheep/wheatbelt in southern Australia.

It is the purpose of this paper to assess the distribution and extent of polymorphism in the Australian populations of *T. terrestris*. The implications for weed control programmes are considered.

Taxonomy and Cytogenetics

The genus *Tribulus* is in the family Zygophyllaceae and has been placed by Engler (1931) in the subtribe Tribulinae within the tribe Tribulaceae and the subfamily Zygophylloideae.

T. terrestris is the most widespread species in the subtribe even if native range alone is considered. Two subspecies subsp. *terrestris* Kern. and subsp. *orientalis* Kern. are sometimes recognised but they do not appear to have any discreet patterns of geographical distribution and are therefore best regarded as varieties (Tutin 1968). Other varieties are *occidentalis* Kern., and *typicus* Beck. The members of the genus are (with the exception of the African *T. excrucians* Wawra. herbaceous annuals or perennials. The genus is not a large one and has about 54 species (Phillips 1951) confined to the dry tropical and sub-tropical regions, chiefly Africa and Australia. There are 19 species in Australia including *T. terrestris*, of these 18 are indigenous (Willis 1962).

South African members of the genus are reasonably well understood as a result of the study by Schweickderdt (1937). His study also provided an introduction to the extensive synonymy which exists in the nomenclature of the genus. Schweickderdt lists

* CSIRO Division of Plant Industry, Riverina laboratory, Deniliquin, New South Wales.

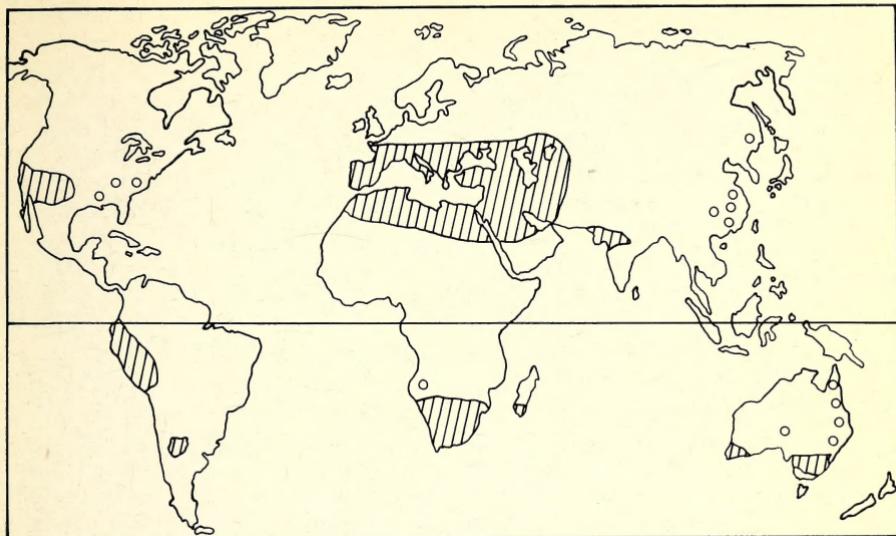


Figure 1—World distribution of *Tribulus terrestris* with outliers shown thus:— O.

a number of taxonomically important characters; habit, length of the pedicel, size of the flower, size and shape of the stigma, form of the fruit, and nature of the intrastaminal glands. He concludes that the structure of the intrastaminal gland (situated at the base of the ovary) has great taxonomic value. Two forms are recognized: (a) glands free and distinct, not connate; (b) glands connate to form a shallow cup at the base of the ovary.

In *T. terrestris* the intrastaminal glands are free and not joined to form a definite cup around the base of the ovary, whereas the closely related *T. cistoides* shows the presence of this cup. *Cytology* — The basic chromosome number of the genus *Tribulus* is six (Baquar, Akhtar and Hussain 1965; Malik 1966; Porter 1968). Chromosome races exist within *T. terrestris* where diploid ($2n = 12$), tetraploid ($2n = 24$), hexaploid ($2n = 36$), and octoploid ($2n = 48$) forms have been described (Malik 1966). Chromosome counts on material identified as *T. terrestris* have been

reported from Argentina ($2n = 48$, Schnack and Covas 1947), California ($2n = 24$, Heiser and Whitaker 1948), India ($2n = 12$, $2n = 24$, $2n = 48$, Malik 1966), Italy ($2n = 24$, Negodi 1939), Japan ($2n = 24$, Sugiura 1940) and Pakistan ($2n = 12$, Baquar, Akhtar and Hussain 1965). Malik (1966) reports that, with the increase in the level of ploidy, taxa exhibited appreciable gigantism in most of the characters especially flower and pollen size. The chromosome status of Australian material has yet to be established.

Geographical and Altitudinal Distribution

Tribulus terrestris s.l. has a wide distribution, both latitudinally and altitudinally. The native range is Eurasian, between 30° and 50° N latitude from the central Russian Steppe, through Mongolia, Manchuria, Germany, Poland and the countries bordering the Mediterranean. Figure 1 shows the world distribution.

It has been known since 1903 as an alien in North America (Davidson 1903) and now extends from the eastern seaboard of U.S.A. through to Mexico. *T. terrestris* has been recorded in South America at localities ranging from the equator to Ecuador (Svenson 1946) through Peru (MacBrade 1943) to 32°S latitude in Argentina (Descole 1943).

Harvey (1838) states that it was recorded from South Africa as early as 1794. The geographical range recorded by Schweickderdt (1937) is from Angola (15°S latitude) to Cape Province (35°S) and the altitudinal range from less than 100m. at 15°S to over 1000m. in Orange Free State (29°S).

On the Indian sub-continent it is well established as a weed of crops (Misra 1962).

The distribution in Australia of herbarium material placed under *T. terrestris* is a quite extensive ranging from the tropical areas to the southern sea shore, from the desert of central Australia to the coastal dunes of South Australia (Figure 2). It has been recorded in localities with annual rainfalls from < 5 inches to > 65 inches. *T. terrestris* appears to be adapted to a wide range of climates but optimally to semi-arid and Mediterranean types.

The limits of distribution of the introduced form have been defined by Squires (1969). The localities at which *T. terrestris* is considered a major problem are all within the zone with a normal daily maximum in January above 85°F (29.0°C). Outside this zone it is considered a minor problem. Relatively high temperatures are re-



Figure 2—Map of Australia showing localities from which herbarium specimens of *T. terrestris* have been collected. The dashed line represents the limit of distribution of the introduced form.

quired for germination and growth. The vegetative stage is extremely short. The minimum time recorded from emergence to first flower was 21 days at Deniliquin (35.30°S).

Polymorphism

Tribulus terrestris is exceedingly variable in both vegetative and reproductive characters. Schweickderdt (1937) in a study of South African *Tribulus* found that they were "very plastic with regard to size, shape and indumentum etc. of the vegetative parts" (p. 160). The length of the pedicel and flower size were found to have some taxonomic value. Taxonomically, the fruits were of the greatest value. He also remarks (p.

161) that "there appears to be evidence in favour of natural hybrids among the species of *Tribulus* from southern Africa".

No recent work has been undertaken on Australian material within the genus *Tribulus* for which at least 19 species have been described. Of these 18 species are based on Australian types.

For this study material identified in Herbaria as *T. terrestris* was collected from several localities in Australia (Figure 3) and abroad. The fruits were photographed (Figure 4). It will be noted that maximum contrast is found in comparison between the central Australian material (Figure

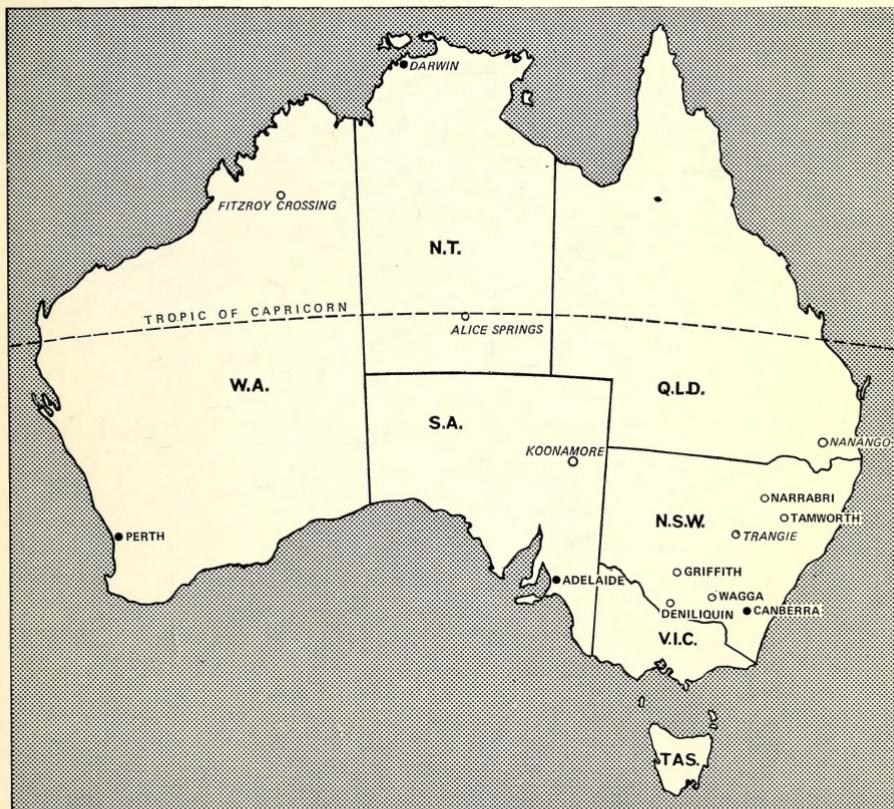


Figure 3—Map showing names of places mentioned in the text. The names of localities from which fruits of *T. terrestris* were collected are shown in italics.

4c) and that of the introduced form, whether of European origin (Figure 4a) or from Kansas, U.S.A. (Figure 4b). The number of spines and the degree of hairiness of the mature fruits differ considerably.

Forms from more arid regions (Alice Springs and Koonamore) are extremely hirsute (Figure 4c, 4d) while those from humid areas are glabrous. Four well defined spines are to be found on the form from Trangie (4g) and, indeed, on all of the southern Australian material examined by the author. Note that though the 4-spined form occurs at Fitzroy Crossing in the north-west of Western Australia, the spines are almost equal in length and both pairs project in the same plane (Figure 4h).

"Spineless" forms grade into normal forms, spined and spineless mericarps being found on the one schizocarp.

Examination of herbarium material shows that flower size is greater, petals up to 12 mm long, in material col-

lected north of latitude 25°S. Description of the Linnean type suggest extremely small flowers (petals 3 mm long), but taking various standard works on the Floras of Central Europe and North America into account, one finds that the limits by which these various authors define *T. terrestris* L. show a wide discrepancy. Some define the petals as being "3-4 mm long", again "up to 10 mm long". The intro-some state "6 mm long" and others duced form on which Squires (1969) based his studies had petals 5-6 mm long.

Discussion

Tribulus terrestris, as accepted in this paper, i.e. native and introduced, is an exceedingly variable species occupying a mosaic of micro-environments associated with soil texture, microtopography and other factors such as soil nutrient status, not readily apparent to human observers. It is probably impossible for a species, due to limitations of biological processes,

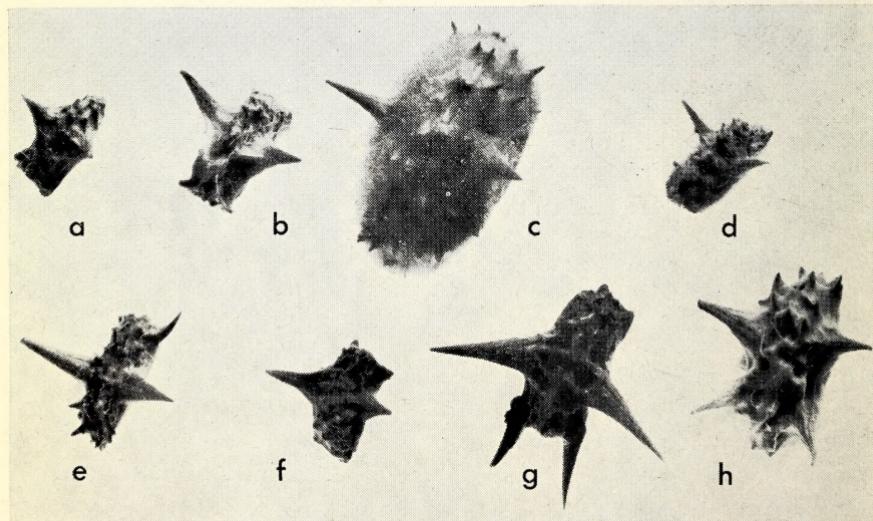


Figure 4—Identified as *T. terrestris* from a number of localities throughout Australia and overseas. (a) Paris (France); (b) Kansas (U.S.A.); (c) Alice Springs (N.T.); (d) Koonamore (S.A.); (e) Darwin (N.T.); (f) Nanango (Qld.); (g) Trangie (N.S.W.); (h) Fitzroy Crossing (W.A.).

to develop an all-purpose genotype with infinite plasticity to fit the mosaic of environments. This view of the pattern of ecological variation leads to the expectation that a population of *T. terrestris* occupying a land mass the size of Australia, should assume a genotypic mosaic corresponding to the mosaic of environments available (Allard 1965).

Clearly recognisable forms often occur within a single species which are related to differences in substrate, topography or climate. Differences between these "ecological races" may be so great that some taxonomists call them distinct species (Heisey and Milner 1965). An important property of ecological races is their ability to interchange genetic material in crossing. However, in some polyploid species barriers to cross-breeding may be present. Polyploidy itself adds considerably to the variability which might be recorded. Malik (1966) has suggested that intraspecific polyploidy has played an important role in the evolution of the diverse morphological taxa within *T. terrestris*.

It appears (Wilsie 1962) that polyploids are more tolerant of extreme ecological conditions than their diploid relatives and therefore have wider geographic ranges. However, this tendency is not universal.

From the viewpoint of weed control even slight variation in form can lead to considerable differences in response to herbicides. Sexsmith (1964) studied morphological and herbicide susceptibility differences among strains of *Cardaria chalepensis* (L.) Hand.-Maz. Strains varied greatly in leaf size and

shape, spreading ability, stand density and reaction to treatment with several herbicides. Similar differences in response have been reported by Hodgson (1961) for *Cirsium arvense* Scop.

Careful breeding experiments and cytological examination of a range of Australian material would no doubt throw light on the question as to whether the material referred to *T. terrestris* is only one extremely variable species or whether at present several closely allied species are included under this name.

Acknowledgements

Thanks are due to the following people for collection of fruits of *T. terrestris*. Mr. D. E. Symon, Waite Institute of Adelaide, Mr. J. R. Maconochie, Northern Territory Administration, Alice Springs, Mr. E. Cuthbertson, Mr. J. Ryan, Mr. D. McNamara and Mr. D. Pearson, officers of the N.S.W. Department of Agriculture, Mr. P. Cary, CSIRO, Griffith, and Mr. G. W. Meadly, Department of Agriculture, Perth, and Miss D. Johns, Plant Introduction Officer, CSIRO, Canberra, arranged for overseas material to be made available. Drs. P. W. Michael, R. H. Groves and N. T. Burbidge, CSIRO Division of Plant Industry, Canberra, gave freely of their time to discuss the problem of polymorphism.

Part of the material for this paper arises from a thesis submitted to the University of New England as partial requirement for the degree of Bachelor of Letters.

The photographs were taken by Mrs. J. Simpson, CSIRO, Canberra.

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Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor.

Our Neighbours, the Wattlebirds

This interesting note comes from Mrs. Ellen Lyndon of Leongatha, Victoria.

A pair of Red Wattlebirds control the territory we live in and most of the half acre of park opposite. They harass the Kookaburras and sometimes the Magpies by grasping their tail feathers and propelling them from the scene. Young Magpies on the ground are frequently dive-bombed quite savagely. Therefore it was with some surprise and not a little amusement that I observed a male Wattlebird being booted over the hedge of the big garden across the intersection, and this by a pair of irate Blackbirds.

In the spring of 1968 the Wattlebirds nested in *Melaleuca styphelioides* and raised one chick. As it matured they began building again in a nearby elm tree. A container of syrup was set up on our verandah railing and by Christmas one bird was sitting and the other running a shuttle service between the jar outside our window and the nest. The bird would launch itself across the busy road, swooping low and rising to the railing. It would sip and swallow several times, then take four or five quick dips in the syrup without swallowing, before flying back to a favourite perch, thence to the nest, presumably to feed the brooding mate. This behaviour pattern took place at frequent intervals during the day while the supply lasted. The jar was refilled at evening, for these birds are most active in the twilight, feeding up till 8 p.m. at least. Two young were hatched, and, as far as we could tell, the honey and water syrup was regularly fed to them. As they grew, large winged insects were caught, brought to the syrup jar and dunked, before being offered to the nestlings. Some of the victims were very big, judging by the extent of leg and wing protruding from the birds' bills. The liquid provided varied according to what was available on a particular day. Honey, sugar, golden syrup, home-made raspberry jam, stewed fruit juices, all diluted

with water, proved equally acceptable. We always knew if a bee had fallen into the jar and was swimming round by the bird's frantic attempts to take a sip and leap back quickly. They have the greatest respect for bees.

Later the Wattlebirds were to prove rather a pest, for a party of Little Lorikeets arrived to feed in a flowering eucalypt. These beautiful little strangers quite distinct.

were new to me and I was to spend much time observing their antics as they hung head downwards among the blossoms and raced along the limbs on their tiny legs. The Wattlebirds took a perverse delight in following me across the park and falling upon the Lorikeets, flushing them and sending them screeching for cover.

But they are, on the whole, bold and cheerful birds, enlivening the scene when few others are about.

Galls

These notes come from Mr. A. J. Swaby of Surrey Hills, Victoria.

Last winter, each flowering tip of Cootamundra Wattle had three zones. The oldest had galls without tufts of stamens. Next, in greater number, came tufted galls. A much longer top had perfect flowers, enough to make a lasting display.

Eggs must have been deposited when buds were minute, not yet showing rudimentary florets and the insects, same or succession, about for many days. Early and more frequent inspection next season, should detect them.

Anyone interested in the emergence of mature insects from the galls should begin this month with a piece of nylon stocking slipped over the galls and tied at each end. That would apply for most species that bloom in spring.

Does each wattle have its special parasite?

Of Bread and Pumice

By J. B. CLELAND

If one can imagine a loaf of aerated bread becoming petrified, the result should be something like a piece of pumice stone. It is therefore quite possible that the preacher, in *Ecclesiastes* (Chapter 11, verse 1), was referring to a piece of pumice stone when he wrote, "Cast thy bread upon the waters for thou shalt find it after many days". This possibility raises several questions, and in attempting to answer them we must visualize the Biblical World of King Solomon.

Firstly, what knowledge could the Israelites have had of pumice stone? Secondly, what cereals and methods did they use in baking a loaf of bread (and in particular how was its aeration achieved so that a loaf could possibly float in water for some while)?

There are no active volcanoes in Palestine or Mesopotamia and these places are some distance by sea from any such things, either in the Mediterranean or the East Indies, so that the Israelites could have never seen an actual volcanic eruption. Pumice from either the West or the East would take a long time to reach the coast of Palestine on the one hand or the Red Sea and the Persian Gulf on the other. To the dwellers along those shores the arrival of light, floating, pumice would be a puzzle, and a likely explanation of it would be that it was bread that had been converted after a long period into stone.

This may or may not be the origin of the phrase, "Cast your bread upon the waters", but in any case one cannot accept the other explanation offered in *Brewer's Dictionary of*

Phrase and Fable—"When the Nile overflows its banks the weeds perish and the soil disintegrates. The rice-seed being cast into the water takes root, and is found in due time growing in healthful vigour". This is not tenable, because rice was not grown in Egypt in the time of *Ecclesiastes* (possibly the 3rd century B.C.): its introduction there is believed to have come subsequently from the East with the Arab invasion.

When one considers the cereals used for bread in Biblical times one comes up against the puzzling reference in the *Book of St. John*, Chapter 6, verse 9 ("There is a lad here with five barley loaves, and two small fishes: but what are they among so many?"). Only wheat and rye contain the protein, gluten, which gives the necessary "glutinous" properties to their doughs and the characteristic bready texture on baking. It is possible to bake other cereal flours, such as oats, rice, maize, and barley into various cakes or biscuits by various baking techniques, but it is *not* possible to make a true bread in the absence of gluten. The lad in the New Testament therefore could not have had pure barley loaves. On consulting the original Greek text in *The English Hexapla*, I find the word was "Artos", which (according to Little & Scott's Greek Lexicon) is correctly translated as "loaf, especially a wheaten one": the Greek word for "barley-cake" ("maza") is not used in the verse at all. However, as Drummond & Wilbraham point out, barley-bread is mentioned not infrequently as a food of the poor in England when the Bible translators were at work,

and was popularly supposed to be a remedy for the gout. The probable explanation is that breads in olden times were often made of mixed cereals ("maslin bread") and a barley loaf would perhaps be a reasonable bread if it contained a proportion of wheat or rye to provide the gluten.

Finally, there is the intriguing art of aerating dough by the gases of fermentation. There are various references in the Bible to show that this leavening of bread was ancient knowledge, and it is interesting to ponder upon the way it was first discovered. One must assume that, as with so many other important technological advances in the misty prehistory of Man, it was a chance happening

arising from his carelessness! It is easy to picture some unleavened dough left behind in a dish, which became invaded by yeast cells so that the next batch of dough was heavily seeded with gas-producing organisms that resulted in a desirable porosity on baking. And small portions of any such leavening could be added to subsequent batches of dough serially down through the ages until techniques became more exact. After all, as St. Paul pointed out (*The Epistle to the Corinthians* Chapter 5, verse 6), "Know ye not that a little leaven leaventh the whole lump?"

REFERENCE: J. C. Drummond and Anne Wilbraham (1939): *The Englishman's Food*, Jonathan Cape, London.

A Ball of Jelly

Rose Creek Road, in the Grampians, crosses the creek over a pipe drain. About a chain down-stream, the creek flows over bare rock. We sat there to cool off on a hot day about New Year.

A ball of jelly rolled over the rock. It was full of specks suggesting eggs. We kept it in water and watched. One morning at breakfast, signs of life appeared and the micro-

By A. J. SWABY

scope kept us all busy in turn.

No—it was not water snail. Definitely the larvae were arthropods, and the eyes suggested a crustacean.

We put the jar on a sill in the shade. On return, we found them cooked.

Some day, one of the many naturalists living near or in the Grampians may conclude the story.

Arena

By McKenzie Creek, near Horsham, a warm Spring day and clean, white sand brought stumpy-tail out to bask. A large snake came too. They met.

The fight was fierce—over and over, tumbling and writhing, each made the most of its weapons. Fangs found a soft spot and stumpy's struggles became weaker. The snake had difficulty in swallowing the lizard.

By A. J. SWABY

It crawled heavily away to find a sheltered spot for digestion.

Why did we let that go on?

We were not there, tracks came from opposite sides of the unused road and every detail of the struggle was clear, including the deeper impression when the snake went off with stumpy inside. We searched without result.

BOOK REVIEWS

SOUTHERN WALKABOUT

By VINCENT SERVENTY

A. H. and A. W. Reed, 1969

Hard cover with dust jacket. 9½ in. x 6¾ in., 160 pages. \$5.50.

"Melbourne is one of my favorite cities. The broad tree-lined streets, the parks, the softness of the light, all add to its charm. As well it is in a sense the headquarters of Australian natural history. Here is the home of the Royal Australian Ornithologists' Union, the centre for strong natural history groups which include the Victorian Naturalists' Club and the Bird Observers Club," remarks Vincent Serventy in his latest book *Southern Walkabout*. Members will need no introduction to this author who is the Editor of *Wild Life in Australia* and producer of nature study films.

His book *Nature Walkabout* described the Serventy family's travels from Perth northwards traversing the top of Australia and south to Sydney. In this book the author, with his wife Carol and their three children, Kathy, Karen and Matt, complete the circuit of the continent from Sydney back to Perth. It is written as though all the events happened on the one journey, for continuity's sake, whereas they occurred during several trips across southern Australia.

Vincent Serventy uses a conversational style of writing, moving fluently from natural history observation, to historical anecdote, to accounts and reminiscences of friends and acquaintances met en-route. Throughout the walkabout the reader is introduced to many well-known names on various scientific expeditions. These names become personal friends as we share the excitement of making new wild life discoveries with them. We are given a glimpse into the private lives of

these people—their personalities and love of the Australian bush.

"The leader of the [Australian Geographical Society's expedition to the Recherche Archipelago] was John Bechervaise, geographer and later to become well known for his work in the Antarctic. With him came James Willis, botanist, of Melbourne. They were delightful companions. I remember one day when Jim did a series of beautiful cartwheels along a sand beach in sheer exuberance at the scientific finds of the day."

Many historical facts have been researched and noted. For instance, it may be of some comfort to the reader to learn that William Dampier, the early English navigator, when at the Swan River Settlement in Western Australia, suffered the same annoyance we all experience with the Bush fly. ". . . to sleep after sunrise was impossible on account of the number of flies which kept buzzing about the face."

A great deal of knowledge is to be gleaned from the book as information on various subjects has been gathered together to collectively make a handy reference work. Answers to such questions as who subsidised the erection of Captain Cook's Cottage in Melbourne, what is "anting", which is the world's most dangerous snake, and how are the giant (over 200 feet) Karri trees felled?

Many people would not consider such a long journey much fun with a young family. However the Serventy's have proved that enjoyment can be obtained although you have to be pre-

pared for some accidents whilst children are making their own natural history discoveries.

"Suddenly I heard a splash and a shout from others on the bank, and I looked over to see a body disappearing under water. I waited and up like a cork bobbed Matt. I reached down and with a smooth heave had him out on the jetty, wet, gasping but unharmed.

"He was more careful after that, and kept one hand for jelly blubbers and the other for gripping."

Over a hundred very fine coloured photographs, taken by the author and

his wife, elaborate and demonstrate various points in the text.

Southern Walkabout is a book very suited for introducing both children and friends to natural history. It is a pleasant readable book, amusing as well as being an adventure story with a difference. People who have seen and enjoyed the T.V. series "Nature Walkabout" will find the book as absorbing as the films. It should encourage readers to take part in the struggle for the conservation of the Australian bush and wildlife.

Rex and Sue Filson.



Three Recent Botanical Publications

Wildflowers of Tasmania

By H. J. KING and T. E. BURNS

Jacaranda Press Pty. Ltd., Milton, Qld., 1969.

5½" x 4". 50 plates in colour. Price \$1.95.

This is the fifth in a series of Jacaranda pocket-books, each of which portrays in colour 50 different wild-flowers that typify a particular State or major region in Australia. With its publication last June we now have an attractive gallery of 235 plant series in 143 genera, including 16 kinds or orchids, 14 wattles and six species of *Grevillea*, *Boronia* and *Helichrysum*. Such superficial sampling of Australia's vast floral wealth is bound to disappoint those who may hope to use the "pocket guide" as a means of identifying their various finds, and it is regrettable that the publishers have allowed no less than 13 species to be duplicated among the five booklets—*Banksia marginata* appears three times (in the guides for New South Wales, Victoria and Tasmania).

Most States can claim fairly up-to-date popular books on their native flowers, but the last Tasmanian publication was Leonard Rodway's *Some*

Wild Flowers of Tasmania (Government Printer, 1922). It contained 58 brown-tone photographic reproductions, some very poor and "fuzzy", illustrating a series of chapters on such topics as Pea-flowers, Eucalypts, Orchid Family and Non-florals. So the appearance of this new booklet, under review, is particularly welcome. In many ways it is the most pleasing and informative in its series, and more than one quarter (actually 14 species) of the plants depicted are Tasmanian endemics. All plates are from colour transparencies by Mr. H. J. King, Tasmania's indefatigable, masterly flower-photographer. His portraits of Blue Gum (the State's floral emblem), Christmas Bells (at the end of the guide) and close-up of Five Corners (single greenish trumpet-flower of a coastal heath) calls for special praise, but the almost exclusively funereal backgrounds of the flower-studies tend to become rather

tions are inaccurate, for instance *Bellendenia* does not signify "beautiful native" but commemorates the name of John Bellenden-Ker, a British bo-

tanist of the early 1800's—with Royal assent he had changed his surname from Gawler in 1804.

Australian Eucalypts

By MERVYN MILLETT

Lansdowne Press, Melbourne, 1969.

7½" x 5". Pp. 111. Illust. 118, 40 being in colour. Price \$1.25.

Notwithstanding a spate of literature devoted to Australia's most important (and second-largest) plant genus, *Eucalyptus*, there is undoubtedly room for more and especially for inexpensive books of digest size. Lansdowne Press has wisely added to its "Periwinkle Nature Guides in Colour" a volume on our eucalypts. Only 33 representative species are described, in some detail; but the aim of the book, as stated on page 24, is "to introduce the reader to the eucalypts", and in this it succeeds very well. In fact, the reviewer has seldom read a more stimulating or meaty introduction to eucalyptology.

Beginning with the history of early investigators from the time of Tasman (1642), we are led to the manifold uses of eucalypts (the author takes exception to the familiar term "gum-tree" which is a silly misnomer), the pests that attack them, their classification, nomenclature and identifica-

tion. For each of the selected species, culled from all over the Commonwealth, there are pertinent notes on the habit, bark, foliage, habitat, range and timber, accompanied by a life-size drawing of buds and capsules and a full-page photograph of the tree in black and white. The 40 colour pictures are generally attractive, in particular those by Dr. J. Child; plates of spectacular *Eucalyptus tetraptera* (on the front cover), the crimson-flowered hybrid "Torwood" and the wrinkled greenish trunk of *E. stellulata* are highly commendable. A glossary of scientific terms, a list of works for further reading and indices to both botanical and common names complete Mr. Millett's useful book which is more than good value for \$1.25. It will undoubtedly be popular, and may it help to increase public interest in a unique national asset—our diversified eucalypt flora.

Orchids of Western Australia

By ALEX S. GEORGE and HERB E. FOOTE

Westviews Pty. Ltd., Perth, 1969. 9" x 7". Pp. 30. Colour plates 39. Price not given.

One would have thought that, after the second edition of Mrs. Rica Erickson's *Orchids of the West* (Lamb Peterson Pty. Ltd., 1965), there would be little demand for another, considerably thinner booklet on the same subject. But the pattern is entirely different. Here we find close-up colour portraits of 36 different orchids (one quarter of the State's total), re-

produced with great clarity on glossy grained paper from photographs by Herb Foote who is President of the Orchid Society of Western Australia. Alex George, of the Western Australian Herbarium, has written 30-100 words of descriptive text about each plate. These pictures are a sheer delight, worth having for their own sake, and they embrace no less

than 20 species of the spider-orchid genus *Caladenia* which attains its highest morphological diversity in this South-West region. Attention is drawn to some of the more interesting

features of Western Australian *Orchidaceae* on the two middle pages of the brochure which, unfortunately, is neither paginated nor indexed.

—J. H. WILLIS.



Australian Butterflies in Colour

Photographs by E. R. ROTHERHAM, text by ALEXANDER BURNS.

Syd., A. H. and A. W. Reed, 1969. \$3.95, Hard cover with dust jacket.

Approx. 7" x 7½", 112 pages.

Many older members may have commenced their natural history careers as butterfly collectors. Armed with net and specimen bottle many happy afternoons were spent chasing butterflies over the paddocks. This hobby seems to have lost its popularity over recent years. Could it be that people are becoming more lazy and would rather indulge in less energetic hobbies? Could it be that the ever increasing use of insecticides has realized a decline in butterfly numbers? Perhaps this book will help to revive interest in these brightly coloured insects.

When Alexander Burns collaborated with Charles Barrett to produce "Butterflies of Australia and New Guinea" collectors thought this to be the answer to their prayers as it provided good descriptions with sixty species illustrated in colour. "Australian Butterflies in Colour" illustrates eighty-five species, the text has been expanded, new name combinations included and an excellent distribution map accompanies each species.

The format of the book is similar to others in the series, with a page of text facing a page of coloured illustrations. The publishers have corrected a bad feature of earlier works seen by the reviewers, by including the captions for the illustrations underneath the pictures and not on the text pages. Where the male and

female butterfly are different, they are both illustrated.

The text is arranged in columns. It is comprehensive, giving a full description of each butterfly, its life cycle—eggs, larvae, pupae—distribution and interesting notes on varieties and races.

E. R. Rotherham, a member of the F.N.C.V. and co-author of "Flowers and Plants of Victoria", took the excellent clear photographs. His choice of background highlights the detail of the wing structure and natural colouring of each species.

The Introduction gives a brief history of publications on Australian butterflies, a few essentials on the classification, life cycle, feeding, distribution, migration, predators, sexual attraction, seasonal coloration, wing structure and sexual dimorphism of the insects. The frequent question on the difference between a moth and a butterfly is answered.

Both common and scientific names are listed in the index. A short errata is tipped into the book.

If you did not graduate from butterfly collecting, after reading "Australian Butterflies in Colour" you will wish you had. The book serves as a good introductory text for the amateur as well as being an authoritative work for the serious collector. This is a book for every naturalist's library.

—REX and SUE FILSON.

More Grinding Rocks at Munro

By ALDO MASSOLA*

At the invitation of Mr. S. C. Fletcher, of "Eastwood", Munro, I was enabled to inspect five additional sites with either single examples or groups of small fine-grained sandstone outcrops bearing grinding grooves made by the Aborigines in grinding their stone axes. These occur both on Mr. Fletcher's and on nearby properties, and I here wish to express my thanks to him and to his neighbours, whose names appear in the text, for their hospitality and for the time they spent in taking me around.

The articles dealing with previously discovered grinding rock sites in this area were published in the *Victorian Naturalist*, **84**, p. 207 (Massola) 1967; **86**, p. 152 (West) and p. 208 (Massola) 1969. These papers reported six sites, of which the first four were unfortunately given conflicting numbers, and the next two were left un-numbered. Allowing for those six, the first of the new examples should become known as Site No. 7.

Site No. 7 consists of a single rock not now in its original position, having been dug up during farming operations; but it remains close to where it once was, about 100 yards west of Eastwood homestead. The rock surface measures 3 ft. by 2½ ft., and bears one grinding groove about 7½ ins. long by 2½ ins. wide.

Site No. 8 is also a single rock of similar size to No. 7, and like it, it only bears one grinding groove about 7½ ins. long and 2½ ins. wide. This rock is still in its original position, about a quarter of a mile south-west of my original No. 1, not far from the south fence of "Eastwood".

* 4/18 Wolseley Street, Mont Albert 3127.

Site No. 9 is on Mr. John Bedwell's property on the north side of the highway, opposite "Eastwood". It is about one and a half miles north of my original No. 1, and is easily found since it protrudes from the ground about the centre of the car track leading to Mr. Bedwell's homestead. The rock measures about 4 ft. by 4½ ft., and bears two grinding grooves, one about 10 ins. long by 2¾ ins. wide, and the other about 10 ins. long and 2½ ins. wide.

About 36 feet south-east from this rock there is a second one, which was almost entirely covered by the soil. When uncovered we found it to measure about 3 ft. by 3 ft., and to bear a grinding groove about 10 ins. long by about 3 ins. wide.

The paddock in which these two examples occur (Site No. 9) is on a noticeable rise and has been ploughed many times. These two rocks are possibly the only surviving ones, all others in the area having been dug up over the years, and it is strange that they should both bear grinding grooves. About 200 yards west of these outcrops there is a waterhole, which was once a swamp.

Site No. 10 consists of a smallish rock, measuring about 2 ft. by 1½ ft., with one grinding groove about 5 ins. in length and 2½ ins. in width. It is one of several rocks (of which only this one bears grinding marks) outcropping in a clump of trees on high ground about half a mile south of No. 9 Site and on the same property. Water for this site is available from two places on the low ground, both of which are about 100 yards away, one to the north-east and the other to the south-west of the clump of trees; and

Mr. Bedwell affirms that water remains there quite a long time after rains before evaporating or being absorbed by the soil.

Site No. 11 consists of a small group of boulders outcropping in one of Mr. R. G. Duncan's paddocks, about one mile west of No. 10 and about one mile north-west of my original No. 1. Three rocks of this group bear grinding grooves. One rock measures about 6 ft. by 5 ft., and has four grinding grooves upon it, each measuring about 7½ ins. in length and about 2½ ins. in width.

The second rock is about 3 ft. by 2 ft. and has one grinding groove measuring about 10 ins. in length and 2½ ins. in width; and the third rock, also measuring about 3 ft. by 2 ft., has a grinding groove about 5½ ins. long and about 2½ ins. wide. Water

for this group is available from a small swamp about 100 yards to the north-east.

The finding of these new examples suggests both that more will be located and that they were once very numerous in this area. This part of the country was amongst the first selected when the Great Plain was opened up, and the first settlers and their employees built for themselves the usual type of timber and bark huts with stone chimneys. In this locality the small sandstone outcrops are the only stone readily available, and by using them the settlers were at the same time clearing the land and making it suitable for pasture. All these paddocks have been repeatedly ploughed, and many of the boulders thus brought to the surface have been heaped along the fences; although no grooved ex-



A close-up of Rock A, Site No. 9, at Munro.

Photo: Author.



A typical hut of the district, built of bark and timber with stone chimney.

Photo: Author.

amples were found amongst the heaps examined by us. However, some of these boulders have been used in raising low points along the tracks, and these, of course, could not be examined.

The distance between some of the grooved rocks still in their original position (4 miles between No. 9 and the un-numbered example north of Fiddlers Creek) invalidates my original assumption that the camp of the local Aborigines must have been on the sand ridge close to my original No. 2 site. At the time, of course, only two sites had been reported, and with the sand ridge being within easy reach of both sites and near permanent water it appeared to me that if there were a camp in the area, this would have been the obvious place. With the discovery of all these new sites and the probability that more will be found, or that others once existed, it becomes clear that there probably was no central camping place in the area, and that this particular sand ridge was only one of the many that could have served this purpose.

The uniformity and flatness of this extensive plain is broken by a number

of such slight terrain undulations and low ridges of fluviatile sand and gravel. According to accounts solicited from local "old timers" the plain was originally covered by an open forest of red gum, stringy bark, and red box. There was little or no scrub or even tea-tree, and only a sparse growth of bracken on the sand ridges. Water was plentiful, not only in creeks but also as surface water lodged on the low ground. Food animals were numerous — despite the clearing of the land. Emus and kangaroos are still a common sight — and the plains must have been covered with an infinity of edible roots.

If any Aborigines lived in this locality they would have had little trouble to obtain subsistence locally, and would have had frequent visits from other groups they would have a fairly small group who wandered leisurely over their territory, camping here and there as fancy dictated, and passing time away in grinding river pebbles on the numerous finer-textured sandstone outcrops. In other words, much the same set-up would have existed here as did at the famous axe-stone quarries at Mt. William, near Lancefield, on the

operating of which we have contemporary records. Like their Mt. William counterpart, as well as using the outcrops themselves, the group at Munro would also have allowed visiting groups to use them for a payment in kind that they may have needed, such as weapons or fur rugs.

The finding of two hammerstones, one of which has a pitted area on one of its faces — showing that it had also been used as an anvil for chipping stone implements — is a further indication of the local industry. These were found by Mr. Fletcher and myself during my last visit to the locality, on a gravel ridge exposed by quarrying operations, not far from my original No. 1 site.

On the other hand the locality could well have only been visited by the Aborigines during expeditions taken for the purposes of renewing their supply of axes. The large camps found on the cliffs overlooking the lower reaches of the Avon and the Perry Rivers, and at intervals on the high ground along the shores of Lake Wellington suggest that the local tribe, the Braiakolung, lived mainly there.

One such camp, an important one, was situated on top of the hill on the west side of the Church at Bengworden; and another on Boney Point, a point of land at the junction of the Perry and the Avon Rivers. This point was so called because on it a considerable number of human bones became exposed by erosion, marking the site of yet another unrecorded tragedy. Obviously, some of the Braiakolung camped there were surprised and massacred either by white men from Coady Buckley's Station, or by the Native Police during the search for the White Woman supposedly held by the Gippsland Aborigines.

From these camps, before the coming of the white men, the Aborigines

would set off for their seasonal excursions into the inland by following the rivers; these latter being the highways in heavily timbered regions, such as Gippsland was. In the case of both the Perry and the Avon, this would lead them to the inexhaustible supply of well-shaped water-worn pebbles, eminently suited and ready-made for axe heads, found on the upper reaches of both rivers. Their inland camps would be in the few open tracts of land close to the rivers, such as the one about a mile north-east of Stratford, on a large consolidated sand dune at the south end of a swamp, between the Princes Highway and Cross Creek, the latter a tributary of the Avon River.

Having loaded themselves with suitable pebbles, the Aborigines would then wander over to the grinding rocks, such as those on the Boisdale Estate (see *Vict. Nat.* 82, p. 9, 1965) or at Munro, and no doubt at other as yet unreported places. There the several family groups would spread out, each to one of the grinding sites, and construct rough mia-mias and wind-breaks as shelters while they were there. Food and water was plentiful, and the actual grinding process, contrary to general belief, did not take long.

Once ground the axes were probably not hafted, but carried back to the lake-side camps in net bags, this being an easier way of transport. Hafts could always be fitted as required at a later period.

I realize that the above picture of the local tribe is imaginative; but it is founded upon well known and undeniable habits of the Aborigines. In any case, the presence of the grinding rocks, spread as they are over a vast area and probably with a far greater distribution than at present known, gives weight to my reconstruction.

A Trip to the Grampians

August, 1969

By NANCE MARRIOTT

My husband and I had an exciting week here from 23 August, 1969. We intended following the 1968 trip as described in the *Vict. Naturalist* for June and July.

Armed also with *Victorian Naturalist* copies as far back as 1938, we set out to find plants mentioned in these articles. Such was the abundance of flowering plants along the roadside from Stawell, where we hired a very comfortable cabin at the local camping park, that we did not get far into the Grampians themselves.

Along the Rose's Gap Road, we could not bear to drive on — the abundance of flowers of which we had only read, was a veritable garden.

The various peas; *Grevillea parviflora*, almost entwining itself among other plants; the tiny banksias and larger ones; the beautiful *Grevillea aquifolium* and *G. alpina*, all were there in glorious array. Apart from these there were orchids, acacias, hakeas, and oceans of thryptomene.

On other trips the Helmet Orchids were so numerous that we could hardly avoid standing on them along the tracks.

Near the bridge in Hall's Gap we looked down on to a beautiful specimen of *Grevillea dimorpha* (Flame Grevillia); one plant on its own, of about 5 ft. high and width of 4 ft. It was in full flower. Here also the purple mint bushes were just beginning to flower, as also a mauve lily.

The Astrolomas were magnificent. Two places which interested us were a private property a mile or so before the Sister Rocks coming into Stawell, where Golden Wattles were a picture in recently ploughed soil; and a corner of Crown or council land just after crossing the railway line to Stawell. Here, hundreds of *Grevillea aquifolium* were flowering from pale green through lemon-orange to bright red. An area such as this deserves to be named.

It would be impossible for us as amateur naturalists to hazard a guess at the numbers of species we saw on this our third visit to the Grampians.

Never before have we seen anything like the number and variety of plants flowering. Maybe this was due to the warmer winter preceding our holiday?

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

Sawfly Saga

By ERIC SIMS

On 13 November, 1968, we found on the ground in our Adelaide suburban garden a cluster of sawfly larvae which had apparently just descended from our *Eucalyptus lehmannii* intent upon burying themselves in the soil to pupate. They were certainly well-fed, plump specimens with the usual, bristly, caterpillar-like appearance and the usual habit of rearing up their "tails" to eject offensive globs of goo when we picked the living mass up to place them in a tin containing a bed of earth. Pupation occurred the same day, each burying himself and spinning himself a cigar-shaped papery cocoon, about an inch in length, liberally encrusted with a coat of caked dirt. We roofed the top of the tin with a sheet of perforated plastic, and waited patiently.

The summer of 1968-69 in Adelaide was quite a mild one, and the tin was left in our back verandah under reasonably equable conditions. The first two adult sawflies emerged on 3 March, 1969, and eight more emerged at intervals over the next eight days. They had the typical appearance of such creatures, which, of

course, are not flies at all: they are relatives of the bees and wasps in the Order Hymenoptera, and accordingly are four-winged (not dipterous like true flies). Our specimens were heavily-built insects, about an inch long, with no "waist" between the thorax and abdomen, and with a white dot externally on both sides of each abdominal segment. On first emerging they were light brown in colour but tended subsequently to darken on exposure to the air. Moreover, they still had a definitely anti-septic, "eucalyptusy" smell. The Information Officer of the South Australian Museum identified the genus of one specimen we submitted to him as *Perga*, so we are tempted to assume that it was *Perga dorsalis*, which is the "gum sawfly", although certainly not of the "steel-blue" colour that the books ascribe to this species.

After the last emergence on 11 March (118 days after pupation) we waited anxiously for the rest of the original fistful of larvae to appear as adults, but nothing happened for another month. Then, on 15 April (35 days after the last sawfly had

Figure 1:
Sawfly larvae.





Figure 2:
Dead Sawflies
(? *Perga dorsalis*)
after emergence,
118 days after
commencement
of pupation.

emerged, and therefore 153 days after the original pupation) an ichneumon wasp emerged, followed by eight more over the next six days. The exact species could not be identified by the ever-obliging Information Officer at the S.A. Museum, but perhaps the photographs will help a reader to supply the name? In any case, I still have specimens for any expert who might be interested. Ichneumons, too, are in the Order Hymenoptera, and so have four wings, but there the resemblance to their distant relative (and erstwhile host), the sawfly, ceases. Our ichneumons were really elegant creatures, with antennae as long as themselves, slender waists behind the thorax, and pink abdomens marked with a series of black bars.

There was no obvious ovipositor in any of them so we assume they were all males. The eggs from which they developed had apparently already been injected into the sawfly larvae in November, so that the ichneumon larvae in due course could consume the *Perga* pupae and go through their own metamorphosis, subsequently within the shelter of ready-made cocoons. This fascinating phenomenon, of course, is no new discovery, but the time sequence of events in our little study is perhaps worth recording, and illustrating.

Acknowledgments

I am indebted to Joan Paton and Ray Boyd for the photographs.



Figure 3:
Ichneumon sp.
which parasitized
the sawfly larvae,
and emerged 35
days after the last
adult sawfly.

MAMMAL SURVEY GROUP

ANNUAL REPORT

July 1968 — June 1969

The group carried out 14 surveys during the year, in eight different areas of the State. Details of the survey effort and a summary of results are given in the table below.

The surveys of Stockman's Reward (undertaken by two members of the group as a special project for the Science Talent Search) and of the Riddell area are published as papers III¹ and IV² in the series "Native Mammals in Victoria".

Sample surveys in the Brisbane Ranges are nearing completion; those in the Lerderderg Valley, the Kinglake Ranges and the Otways are about half completed, and work in the Yarra Valley and Mornington Peninsula has begun.

Survey camps have been supported by an average of 13 members and visitors during the year.

The recording of chance sightings continues, and about 230 reports of

the presence of 33 species throughout the State have been recorded. It is intended to publish the data that has been collected in this way as a contribution to the knowledge of the general distribution of native mammals in Victoria. The results of the survey of the metropolitan area in Melbourne are likewise being prepared for publication.

Monthly meetings of the Group have been attended by an average of 14 members and five visitors. Membership has increased this year to 33.

Financial assistance has again been received from the M. A. Ingram Trust for the purchase of equipment, and the Group wishes to acknowledge also the assistance received during the year from the Botany Department, University of Melbourne, the Geelong Field Naturalists Club and the Fisheries and Wildlife Department, Victoria.

1. Vict. Nat. 86, 48, 1969.

2. Vict. Nat. in press.

Summary of Survey Results

1968-69

Area	Number of Surveys	Trap-nights	Specimens caught	Spot-light hours	Specimens seen*	Species identified†
Otways	2	558	101	40.5	77	15
Brisbane Ranges	2	144	9	29.5	37	7
Lerderderg Valley	2	232	34	17.0	38	11
Macedon	2	154	21	27.3	52	9
Kinglake Ranges	2	162	45	46.5	52	8
Central Highlands	2	259	74	23.4	52	19
Yarra Valley	1	55	6	11.0	2	5
Mornington Peninsula	1	78	2	21.3	38	7
Totals	14	1642	292	216.5	348	27‡

* Including daylight sightings.

† From all sources of evidence.

‡ 12 native and 5 introduced species.

Some Interesting Fungi

By ELLEN LYNDON

Sometimes when fungi hunting in the bush, especially in sand country, we pick up dry fronds of bracken fern apparently decorated round the edges of the leaflets with what looks like bobble fringe, scaled down to fairy size. These minute "toadstools" are the spore capsules of one of the more lowly fungi known as Myxomycetes, or Slime Moulds. They are not uncommon but being so tiny often pass

unnoticed on the forest floor, where they play their part in breaking down the plant debris. This particular one is named *Didymium squamulosum*. The fruiting bodies are more or less globular, and under the microscope are seen to be covered with starry clusters of calcium carbonate. They are attached to the host plant, in this case the fern leaf, by comparatively broad columellas, or stalks.



Didymium squamulosum



Hericium coralloides

Photos: D. Lyndon.

Hericium coralloides

During the fungi season in the Darlilmurla area last year a fine clump of *Hericium* appeared in the decaying recesses of an immense fallen Blackwood butt lying in the gloom of a sheltered gully. It was first noticed and photographed in late April but was slightly past its prime and turning yellowish. On 14 April of this year, after a burst of surprisingly hot days, the log was inspected again. Although the bush had been opened considerably by forestry operations the fungus had fruited again in the hollow. Later, on 25 May, with the overhead forest gone and the log further exposed, *Hericium* was not only looking healthy in its original site but had burst through the upper part of the log and formed a fresh clump of the odd toothed branches. Overseas authorities seem to agree that this fungus is edible and good, but who would want to eat such a rare and lovely thing?

Tricholoma nudum, an attractive mauve mushroom, considered to be an introduction associated with oak trees, was picked up on sand dunes at Yanakie on June 4th in company with a variety of other fungi. This is the second record in sandy country far from human habitation. It may be of note that the dunes are heavily camped and tramped by agisted dairy cattle.

Tricholoma nudum was recorded again on the foreshore at Inverloch, 15/7/69, growing under teatree on top of the dune above the beach. Close by was a colony of another *Tricholoma*, almost certainly *Tricholoma personatum*, the Blewit or Blue Leg. These were short of stem and very wavy edged and shed the same pinkish buff spores. Although closely related these two edible mushrooms are quite distinct.

Field Naturalists Club of Victoria

General Meeting 10 November 1969

The President, Mr. E. R. Allan, was in the chair and about two hundred members and friends were present. Members were sorry to hear of the illness of Mr. G. Hooke, and the President is sending to him their good wishes for his recovery.

Sympathy was also expressed for the Editor, Mr. G. M. Ward in his distress at the fatal accident to a near relative.

The minutes of the previous meeting were taken as read on the motion of Mr. Swaby and Mr. Morrison. Eight new members whose names appear in the November *Naturalist* were elected on the motion of Mr. Lewis and Mr. Garnet.

The Secretary, Mr. D. Lee, said that a letter from F. A. Alford had said that the current mining fever in Australia has revealed an interesting connection with Sir Baldwin Spencer, as many letters variously addressed to him from mining companies had been received; Darwin records having shown he was the registered owner of a piece of territory. The subject for the evening was "Aborigines of North and Central Australia" illustrated with Sir Baldwin Spencer's films

which were taken before 1913 — the first ever made of our Aborigines. These were presented by Mr. Owen West, Anthropologist at the Museum. He pointed out the importance of these films historically as it is claimed that Sir Baldwin Spencer was the first in the world to take anthropological films shot in their environment.

Mr. West reminded members that actual moving pictures were first shown in 1895 in Paris, and the next year, 1896, there were seven cinemas in Australia, two in Sydney and five in Melbourne. That Spencer thought to use it five years after its arrival in Australia shows his foresight. His first film was taken in 1901 of Central Australian natives. Mr. West said that Baldwin Spencer was born in Lancashire in 1860 and on taking a course in Fine Arts was led to Biological Morphology and therefore an interest in Biology.

At Oxford, studying Zoology and Anthropology he was with Dr. Edward Tyler, interested in primitive peoples and Dr. Moseley of the "Challenger" who was a keen observer of native people. Dr. Tyler was a referee when Baldwin Spencer applied for a Zoology position for Melbourne.

In 1894 he joined the Horn Scientific Expedition as a still photographer and Zoologist for three months and studied aborigines, and met and became a friend of Frank Gillen from the telegraph station at Alice Springs, a friend of aborigines in the Centre. Thus began an alliance that lasted till the death of Gillen in 1912. He belonged to the Witchetty Grub totem.

In 1896 Spencer returned to the Centre with Gill and published in 1899 an authoritative book "Native Tribes of Central Australia" and then Northern Tribes. He travelled from Adelaide to the Gulf of Carpentaria and made four trips between 1901 and 1926. For a year in 1912 he was the Northern Territory Commissioner and Protector of Aborigines. For seven years he was president of the Professorial Board and associated with the museum which holds his native collection. In 1916 he gave films to the museum. He was interested in Art and sport — one time president of the Council of the Victorian Football League.

When he was 68, in 1928, he became a purser on a British merchant ship going to Tierra del Fuego. He wished to study primitive peoples still. At 69, just after his birthday, he died in Patagonia.

When he took his first cine photographs of the aborigines in 1901, he experimented also with an Edison phonograph with wax cylinders, recording songs. These Mr. West played. The first song related to a tradition of a Snake Man. After this 1901 record, Mr. West played the same song recorded in 1968 on modern equipment, sung by an aborigine in Port Augusta.

A second song — Laborer Song — was recorded in 1901. Both of these were introduced by Spencer whose voice came over clearly on the old record. The second song was also repeated in a 1968 record. The first recordings were taken north of Oodnadatta, and when natives were given a chance to experiment with the phonograph, they thought there was a devil in the trumpet when it was replayed to them.

In April 1901 near Charlotte Waters a native camp of 30 or 40 natives decorated with high headdresses gave a dance which Spencer filmed without instructions on the rate at which to turn the handle. He stood it at the side of the large area to be covered and could not follow the movements when the perform-

ers often ran off into the scrub and ran on again. He said he had to just keep turning at an even pace and "rise to the mentality of an organ grinder". The dance filmed has been described as the Witchetty Grub Dance. Mechanical problems with the primitive machine had to be overcome. Heat and dryness caused wood to shrink and cracks appeared, but they were stuffed with fibre and porcupine grass resin to keep the light out. Dust was also a great problem. This film (1901) was used up in the Macdonnells, and sent back to Melbourne to be developed. In all they included Kangaroo Ceremony; Rain Dance; others of seated groups; preparation for ceremonies; corroborees for all, including women; witchetty grub increase ceremony (performed at Emily Gap); sun ceremony; and eagle hawk ceremony (some beating time with boomerangs).

In a women's corroboree the women stood in a straight line and swayed. Their decorations were a white band on the head. This was made of the recently arrived rabbits' white tail fur stuck on with human blood, and a long string of the fur hanging down one side of the head. This material was the tail tips of several hundred rabbits.

In 1904 he spent twelve months in the Northern Territory and took better apparatus that would move the camera with the performers.

Some 1912 films showed a ceremony with a bullroarer, snake ancestor ceremonies, and a cooking scene. A Melville Island burial ceremony after a mound covered with paper bark had been left for about a year showed dancing with excited laughter and talk to please the spirit of the dead person.

The President thanked Mr. West for the trouble taken in arranging the commentary and presenting these historic films and records. This was supported with enthusiasm by the audience.

In answer to a question Mr. West said the original film was found to be dangerous as it could disintergrate in flames, so a few years ago it was copied and reduced, and the original stock destroyed and a few copies were made.

He said that Mr. Curtis, who was present, was associated with processing some of the films. Mr. Curtis then said he had projected them at the first showing in 1913 in Melbourne Town Hall, and had processed the Bathurst Is. films.

Mr. Garnet pointed out that Sir Baldwin Spencer was also the President of F.N.C.V. for two years, President of the Royal Society, and the first Chairman of the Wilson's Promontory Committee in 1908.

The difficulties of transport were emphasised by Mr. West. In 1901, they had camels to carry films and 30 odd cylinders from Alice Springs to Oodnadatta, and then they went by rail to Adelaide and then by ship to Melbourne. In the 1912 expedition to the Northern Territory they travelled by various means including an old motor. Aborigine porters most of the time carried the huge tripod and heavy cameras.

Mr. J. Baines regretted the difficulty of getting the publications of Spencer now, and he pointed out that in America a paperback of Native Tribes of Central Australia is available. He also asked Mr. West if there had been any films of Spencer's South American journey. None has been received but Lady Spencer donated to our museum artifacts from there.

The Secretary said he had received a letter from the Caloundra Branch of the Wildlife Preservation Society of Queensland pointing out the danger of destruction of a primitive and beautiful area at Cooloola. Cards of protest to be sent to the Queensland Government were on the table for members to sign and post. Miss Piper spoke of the great beauty of this area and the need to keep it.

The Secretary had also received a telephone enquiry about an article in the *Naturalist* on Bald Hill Legends of the Dream Time of the Aborigines; and asking if it will be covered by the water of Cardinia Creek Reservoir. (The article is in Vol. 78, Aug. 1961.) A map of the proposed dam was on the table.

Miss Janet Raff sent a donation towards expenses in establishing co-operation with country clubs as Mr. Swaby had suggested.

The Secretary drew attention to the new book of paintings of 250 eucalypts by Stan Kelly, to *Orchids of Australia* by Nicholls, and *The Last of the Lands* — Handbook on Conservation recommended by Mr. Ros Garnet — the proceeds of the sale for The Australian Conservation Foundation.

Wild Flower Christmas Cards for the Aborigines Advancement League were on sale at 5c each.

Mr. T. Sault announced a ramble in the Cape Schanck area on 14th December.

Nature Notes and Exhibits

Mr. A. J. Swaby: brought a collection of native plants in flower.

Mr. A. Morrison: Blue Asbestos from Wittenoom (crocidolite) and Tiger Eye, i.e. altered crocidolite from Wittenoom.

Mr. I. Morrison: *Laxmannia sessiliflora* — a little nodding lily growing in a pot. From its stems a number of proplike growths go straight to the ground.

Mrs. Bennett: *Pterostylis nutans* kept two months in a glass with soil, forming bulbs.

Mrs. North: *Cladonia maculenta*.

Mr. Ros Garnet: Austral broom rape (*Orobanche minus*) a rarely seen parasite growing fortuitously with *Calostemma luteum* in a pot in a suburban glass house.

Also a rare orchid — scaly greenhood (*Pterostylis squamata*) growing with *Chiloglottis trapeziformis* in a pot. This greenhood came from Cootamundra, but it is also found in the Warby Range and Rainbow.

Mr. D. McInnes showed two kinds of Colonial rotifers and two kinds of hydroids under microscopes. The specimens came from the water near the Ibis rookery at Coolart.

Mrs. Taylor announced that the Quarterly Meeting of the National Parks Association will be held on 26 November, the subject being the Proposed Alpine National Park.

Mr. D. Lee spoke of his idea of making a survey in depth, of areas around Melbourne, investigating plants, insects, birds, etc. It would need about 40 people in four teams each with from six to 12. One team for north of Melbourne, another west, another east, and a fourth coastal. The bird observers and fauna survey groups are working already, but more work should be done in the field.

Mr. Garnet said that the club could do something to help the M. & M.B.W. which is planning an area around Melbourne on a 30-mile radius and are asking for information about flora and fauna, particularly in the Yarra Valley. The information is to be filed for reference.

Mr. Lewis drew attention to the proposal to bulldoze the last natural area in Sandringham for a car park for over 250 cars. Mr. Baines proposed a motion, seconded by Mr. Lewis that the Secretary write a letter of protest to the Sandringham Council against the scheme for the destruction of the foreshore at Black Rock. The motion was carried.

Marine Biology and Entomology Reports

6 October 1969

Mr. R. Condron chaired the meeting which was attended by 14 members.

Mr. D. McInnes and Mr. R. Condron reported on the F.W.C.V. Nature Show held in September last with special reference to the insect, shell and fish sections.

Mrs. Z. Lee showed colour transparencies of Heron Island marine forms, insects and mudibranches.

Mr. D. Long showed specimens of slugs. He reminded members that in 1930 Gabriel recorded European species introduced into Australia. Mr. Long showed four types; some he brought from Mr. Beaumont's property at Berwick.

Mr. D. McInnes showed under his microscope a flagellate which he identified as *Sphaerella*; this species had two flagella; a transparent larva, and varied in colour from green to red. Mr McInnes also reported that he saw a green scum at Seaford beach; this showed biflagellate moving forms; when conditions became adverse these moving forms slow down, pull themselves away from the flagella, and move like an amoeba, but one end projects and the rest of the animal flows into the projection, all forms pointing the same way.

Mr. Ken Strong showed combs from the leg of a spider magnified under his microscope.

Mr. R. Condron brought a stick insect, which at the last meeting was immature, but shows now the winged form, also the old shed skin; also a pupa and larva of the butterfly *Ogyris abrota* taken at Bulleen, which he took from a gum tree with mistletoe and attendant ants. He showed a species of Victorian Hairstreak butterfly pupa which Mr. Condron said was rare. This was taken from under the bark of a gum tree.

Mr. McInnes showed some sea shells from Rottnest Island and Frenchmans Bay, W.A.

4 November 1969

The meeting was chaired by Mr. R. Condron, 20 members being in attendance.

Guest speaker for the evening was Mr. A. Gilmour, Senior Marine Biologist, Fisheries and Wildlife Department, his subject being "Pollution in Westernport Bay". Mr. Gilmour described what had occurred in other parts of the world and what preventive measures could be taken to offset occurrences here. In the next few years heavy industrialization is going to take place on the shores of Westernport Bay. Mr. Gilmour suggested that we could learn from overseas experience, and measures were being taken in this more toxic. This talk was illustrated with colour transparencies of different apparatus used in obtaining samples from the sea floor. Members found this talk of great interest, and at its conclusion many questions were asked. A vote of thanks to Mr. Gilmour was moved by Mr. T. Kelly.

Exhibits

Miss Jenny Forse showed a series of black and white photos of bull ants, and gave a short talk on their habits.

Mr. D. McInnes reported that "Water Bears" (Tardigrades) were appearing in his pond again.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 8 December—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—"West Australia". Club excursion August 1969.
4. Election of new members.

Ordinary

Mrs. Vyrall Fritze, 10 Rix Street, Glen Iris, 3146. (Interest—Botany.)

Mr. David C. Long, 68 Abbegate Street, Oakleigh, 3166.

Miss Kathlene N. Roberts, 17 Oak Avenue, Elsternwick, 3185

5. General Business.
6. Nature Notes and Exhibits.

Monday, 12 January—Members' Night. (To be arranged.)

GROUP MEETINGS

Thursday, 11 December—Botany Group Meeting.

There will be no other Group Meeting held between the December and January General Meetings, according to advice received.

F.N.C.V. EXCURSIONS

Sunday, 14 December—A Nature Ramble will be held along the Ocean Reserve between Cape Schanck and Rye Back Beach. Those wishing to attend, contact either B. Cooper, 29 7379; T. Sault, 80 2571.

Friday, 26 December to Sunday, 4 January—Mt. Beauty with day excursions to Bogong High Plains, Mt. Hotham and other places of interest. Coach leaves Flinders St., outside Gas and Fuel Corp. at 9 a.m. on Friday. Bring a picnic lunch. (See other details in November *Vict. Nat.*).

